

CLAIMS

What is claimed is:

- 1 1. A method comprising the steps of:
- 2 a) providing subscriber loop pull-down circuitry operating in a first voltage
- 3 domain, wherein the subscriber loop pull-down circuitry decreases at least one of a tip
- 4 and a ring line current in response to a corresponding pull-down control signal; and
- 5 b) providing control circuitry operating in a second voltage domain wherein
- 6 the first and second voltage domains are substantially distinct, wherein the control
- 7 circuitry varies the pull-down control signal in response to a sensed current corresponding
- 8 to an associated one of a tip pull-down current and a ring pull-down current.
- 1 2. The method of claim 1 further comprising the steps of:
- 2 c) providing pull-up circuitry, wherein the pull-up circuitry increases the at
- 3 least one of the tip and ring currents in response to a corresponding pull-up control signal
- 4 provided by the control circuitry.
- 1 3. The method of claim 2 wherein for each of the tip and ring lines, the pull-up and
- 2 pull-down control signals are mutually exclusive such that the control circuitry does not
- 3 provide a pull-up and a pull-down control signal for a selected line substantially
- 4 simultaneously.

1 4. The method of claim 1 further comprising the step of

2 c) providing a feedback isolation stage, wherein the feedback isolation stage
3 converts voltages sensed at each end of a tip sense impedance and a ring sense impedance
4 into first and second currents, wherein the sensed current for a selected one of the tip and
5 ring lines represents a difference between the first and second currents for the
6 corresponding selected one of the tip and ring sense impedances, wherein a difference
7 between the first and second currents for each of the tip and ring lines is calculated in the
8 second voltage domain.

1 5. The method of claim 1 further comprising the step of:

2 c) providing a control isolation stage, wherein the control isolation stage
3 provides the pull-down control signals from the control circuitry operating in the second
4 voltage domain to the pull-down circuitry operating in the first voltage domain.

1 ~~6.~~ A subscriber line interface circuit apparatus, comprising:

2 pull-down circuitry operating in a first voltage domain, wherein the pull-down
3 circuitry varies a current of a selected one of a tip and a ring line in response to a pull-
4 down control signal;

5 control circuitry providing the pull-down control signal, the control circuitry
6 operating in a second voltage domain substantially distinct from the first voltage domain;

7 a control isolation stage coupled to provide the pull-down control signal from the
8 control circuitry to the pull-down circuitry; and
9 a feedback isolation stage providing feedback signals from the pull-down circuitry
10 to the control circuitry, wherein the feedback signals represent a sensed pull-down current
11 associated with the selected line, wherein the control circuitry provides the pull-down
12 control signal for the selected line in response to the sensed pull-down current.

1 7. The apparatus of claim 6 wherein the pull-down circuitry further comprises:
2 a first pull-down transistor having a first terminal coupled to the selected line of
3 the subscriber line and a second terminal coupled to a battery feed node through a first
4 sense impedance, wherein a first sense impedance current is the sensed pull-down current.

1 8. The apparatus of claim 7 wherein the sense impedance comprises a resistor.

1 9. The apparatus of claim 8 wherein the sense impedance further comprises a
2 capacitor.

1 10. The apparatus of claim 7 wherein the sense impedance consists of passive
2 components.

1 11. The apparatus of claim 6 wherein the feedback isolation stage consists of passive
2 components.

1 12. The apparatus of claim 11 wherein the feedback isolation stage comprises
2 resistors.

1 13. The apparatus of claim 6 wherein the control isolation stage comprises active
2 components.

1 14. The apparatus of claim 13 wherein the active components are coupled in a
2 common base configuration.

1 15. The apparatus of claim 13 wherein the active components comprise bipolar
2 junction transistors coupled in common base configuration.

1 16. The apparatus of claim 13 wherein the active components comprise field effect
2 transistors coupled in common gate configuration.

1 17. An apparatus, comprising:
2 a current mirror providing an inverted first sense current from a received first
3 sense current; and
4 a transimpedance amplifier coupled to receive the inverted first current and a
5 second current, the transimpedance amplifier providing a sense signal proportional to a
6 difference between the first and second sense currents, wherein the sense signal is
7 proportional to a pull-down current flowing into a battery feed node of a subscriber loop,

8 wherein the pull-down current is approximately the same as one of the subscriber loop
9 tip and ring currents associated with the first and second currents.

1 18. The apparatus of claim 17 further comprising:

2 a differential amplifier providing an error signal indicative of a difference between
3 the sense signal and a desired signal; and

4 a linefeed driver control circuit providing a pull-down control signal to vary the
5 associated one of the tip and ring currents of the subscriber loop in response to the error
6 signal.

1 19. A subscriber line interface circuit apparatus comprising:

2 a linefeed driver responsive to pull-up and pull-down control signals to vary at
3 least a selected one of a tip and a ring current of a subscriber loop; and

4 a signal processor sensing a pull-down current of the selected one of the tip and
5 ring lines into a battery feed node, the signal processor generating pull-down control
6 signals for the selected current in response to the sensed pull-down current, wherein the
7 linefeed driver does not reside within a same integrated circuit package as the signal
8 processor.

1 20. The apparatus of claim 19 wherein the signal processor calculates the selected
2 current without directly sensing either the tip or ring lines of the subscriber loop.